

# DARPA *Grand Challenge*

## CASH PRIZE



## Rules

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*Los Angeles to Las Vegas*  
[www.darpa.mil/GrandChallenge](http://www.darpa.mil/GrandChallenge)

# Introduction to the Rules



- Participants are governed by Rules and procedures
- Specific procedures will be developed later
- These Rules are for discussion
- Don't restrict revolutionary technical approaches
- Rules precedence
  - Safety
  - Legal compliance
  - Fairness
  - Challenge goals
  - Efficient operations
- Rules will change



# Eligibility



- Lead
  - Any U.S. entity except Federal Government
  - FFRDCs as long as no Federal funding is used specifically to prepare for or participate in GC
  - Federal employees on their own time
- Team members
  - Any of the above plus foreign entities

# Sponsorship



- No DARPA financial assistance
- No DARPA endorsements or sponsorship arrangements
- Teams may secure own sponsors

# Insurance



- You are expected to get insurance to cover:
  - All of the people on your team
  - All of your vehicles
  - Anything you bring with you to the challenge
- The coverage should include:
  - Personal injury to your team members
  - Personal injury to anyone else that might be impacted by your vehicles, personnel or equipment
  - Injury to the property of others
  - Environmental damage along the route
  - It is up to you whether you wish to cover your vehicles for risk of loss
- The Government is self-insured and will not expect you to have insurance to cover our equipment or personnel (except for your negligence)
- We will post additional information and the names of potential insurance providers on the Grand Challenge website

# Challenge Vehicle



- One team – one challenge vehicle
- Must be ground vehicle
  - Propelled & steered by resistance with the ground
- Unitary system
- Unmanned and autonomous
  - All sensing and processing is onboard
- No physical limits
  - Nature of route dictates practical limits
- May not violate land-use restrictions
- No classified data or equipment
- Hazardous approaches may not be permitted

# Challenge Vehicle



- Autonomous intelligent behavior required
- Position-determination approach
  - Signals to be freely available to all teams  
(or DARPA waiver with notification to all others)
  - GPS alone will not be sufficient to complete route



# Unsurfaced Roads (40-60%)

## Winding





# Safety Vehicle



- Ground or aviation
- Ground vehicles must meet safety requirements of SCORE Intl <[www.score-international.com](http://www.score-international.com)>
- Ground vehicles not required to be street legal
- Must seat at least two
  - Team driver/pilot
    - Responsible for safe operation of Challenge Vehicle unless two team members are in Safety Vehicle and other is responsible
  - DARPA Field Judge
    - Responsible for on-route judging
    - Augments safety observation
- May not lead Challenge Vehicle
- OK to swap Safety Vehicles & people

# Route Rules



- Speed limits
  - Definite possibility
  - Some areas will allow unlimited speed
- Non-Team vehicles on Route
  - Only if approved by DARPA
- Lateral boundaries
  - Designated to comply with safety and land-use authorities

# Route Rules



- Passing
  - No vehicle may intentionally operate so as to hinder a passing vehicle
  - Passing is permitted if done within lateral boundaries
    - An impeding disabled vehicle having no movement for ten minutes is disqualified—OK to move it off course
    - Time credit for waiting team(s)
  - Safety Vehicles
    - Give way to passing vehicles except no obligation to violate lateral boundary
    - May not violate lateral boundary in passing



# Route Rules



- Physical contact with Challenge Vehicle
  - Prohibited on Route or in Checkpoint Area
- Jettisoning material
  - Intentional is prohibited
  - Unintentional must be recovered and transported
- Departure time limit
  - Must clear the line within one hour of signal
- Maximum finishing time
  - Six hours (corrected) to qualify for cash award
  - Ten hours (total) to complete route

# Route Rules



- E-Stop
  - Manual
  - Wireless
    - Maintains link between Safety and Challenge Vehicle
    - Interruption of link halts Challenge Vehicle
      - Line-of-sight interruption
      - Manual interruption
    - Field Judge may order E-Stop
    - Challenge vehicle must resume when link re-established
      - Time credit for E-Stop if for safety
- Neutral gear capability

# Route Rules



- Checkpoint Areas
  - Not part of route
  - Mandatory stop (20 minutes credit)
  - Two-way signaling permitted; not required
    - Waypoint navigation sufficient if only stopping
    - Manual control of behavior not permitted



# Route Rules



- Waypoints (approximately 1000)
  - Mandatory parts of route
  - Purposes
    - Safety
    - Keep vehicles in compliance with land permits
    - Present vehicles with obstacles
    - Provide mandatory time limits
    - Define endpoints of Route
  - Must pass through each waypoint
    - Within error circle (radius to be determined)
    - Not all waypoints will be visibly marked for judging
  - Waypoint data given to participants prior to start
    - Some waypoints will have maximum time to reach
  - Waypoint navigation is not sufficient
    - Error exceeds some lateral boundaries
    - Autonomous sensing and behavior required

# Waypoint List for Discussion



Waypoint Number	Lat	Lon	Speed limit from this waypoint (MPH)	Left Lateral Boundary (ft)	Right Lateral Boundary (ft)	Max time after start
1	NDD MM.mmm	WDDD MM.mmm	200		6000	
2	NDD MM.mmm	WDDD MM.mmm	200		6000	
3	NDD MM.mmm	WDDD MM.mmm	200		6000	
4	NDD MM.mmm	WDDD MM.mmm	200		6000	
5	NDD MM.mmm	WDDD MM.mmm	200		6000	
6	NDD MM.mmm	WDDD MM.mmm	200		6000	
7	NDD MM.mmm	WDDD MM.mmm	200		6000	
8	NDD MM.mmm	WDDD MM.mmm	200		6000	
9	NDD MM.mmm	WDDD MM.mmm	200		6000	
10	NDD MM.mmm	WDDD MM.mmm	200		6000	
11	NDD MM.mmm	WDDD MM.mmm	200		6000	
12	NDD MM.mmm	WDDD MM.mmm	200		6000	
13	NDD MM.mmm	WDDD MM.mmm	200		6000	
14	NDD MM.mmm	WDDD MM.mmm	200		6000	
15	NDD MM.mmm	WDDD MM.mmm	200		6000	
16	NDD MM.mmm	WDDD MM.mmm	200		6000	
17	NDD MM.mmm	WDDD MM.mmm	200		6000	
18	NDD MM.mmm	WDDD MM.mmm	200		6000	
19	NDD MM.mmm	WDDD MM.mmm	30		0006	
20	NDD MM.mmm	WDDD MM.mmm	30		0006	
21	NDD MM.mmm	WDDD MM.mmm	30		0006	
22	NDD MM.mmm	WDDD MM.mmm	45		0009	
23	NDD MM.mmm	WDDD MM.mmm	45		0009	
24	NDD MM.mmm	WDDD MM.mmm	45		0009	
25	NDD MM.mmm	WDDD MM.mmm	20		0009	1:00
488	NDD MM.mmm	WDDD MM.mmm	5		0003	
489	NDD MM.mmm	WDDD MM.mmm	5		0003	
499	NDD MM.mmm	WDDD MM.mmm	45		0006	4:00
500	NDD MM.mmm	WDDD MM.mmm	45		0006	
898	NDD MM.mmm	WDDD MM.mmm	20		0006	
899	NDD MM.mmm	WDDD MM.mmm	5		0003	6:00
900	NDD MM.mmm	WDDD MM.mmm				